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PATENT SPECIFICATION

Inventors: VERNON WALTER MEAGER and STUART NETHERWOOD BARKER

812,980

Date of filing Complete Specification (under Section 3 (3) of the Patents Act, 1949): May 1, 1957.

Application Date: May 2, 1956. *No.13528/56.*

Application Date: Dec. 5, 1956. *No. 37161/56.*

(Patent of Addition to No. 742,804 dated Feb. 19, 1954).

Complete Specification Published: May 6, 1959.

Index at acceptance:—Class 39(2), E1.

International Classification:—F21b.

COMPLETE SPECIFICATION

Improvements in and relating to Electric Battery Lamps

We, B. M. LAMPS LIMITED, of 7, Brunswick Place, Southampton, a British Joint Stock Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to electric battery lamps of the self-contained type.

In our prior Specification 742,804, we have described an electric battery lamp, comprising a casing having a closed end and an outwardly flared open end with a flanged rim, the casing being provided at its open end with a rim-fitted metal reflector including a bulb-holder, in which a removable ring or collar made of rubber or like resilient material holds the rims of the casing and reflector towards one another while preventing direct contact between them and permitting their partial relative rotation to effect switching of the lamp circuit.

The present invention consists of an improved electric battery lamp in which a bulb-holding reflector, which is partially rotatable in relation to the casing by means of a ring or collar to effect switching of the lamp circuit, as in our aforesaid Specification, is also movable axially or by tilting in relation to the casing in order to provide for intermittent illumination of the lamp, by bringing the rim of the reflector into contact with the open end of the casing. In order to avoid accidental closing of the lamp circuit by axial or tilting movement of the reflector, for example when the lamp is stowed out of use, there may be provided an additional position in the rotary movement of the reflector, at which position it will be locked against axial or tilting movement.

The resilient rubber ring or collar holding the reflector and casing together may conveniently be provided with one or two internal annular grooves in which the rims of the reflector and of a front glass or the like are engaged, the ring or collar fitting around the open end of the casing by means of a cylindrical flange formed integral with the ring or collar. With this flange engaging sufficiently tightly to exclude damp, water and dust under normal conditions, the fitting of the ring or collar or the axial movement of the reflector for intermittent illumination of the lamp is liable to set up a slight compression of the air enclosed in the lamp casing, sufficient to lift the flange from engagement, with consequent escape of air; the return of the reflector to normal position will then produce a slight vacuum inside the casing, which may draw in damp air or even suck in water or dust, if subjected to such conditions.

The invention therefore also provides for means to prevent such escape of air and consequent partial vacuum, even to the extent of retaining a slight pressure of air inside the lamp casing, so as to eliminate the risk of damp water or dust being introduced into the lamp.

The invention is hereinafter described with reference to the accompanying drawings, in which:—

Fig. 1 is an elevation, in half section, of an electric battery lamp in the "on" position.

Fig. 2 is an enlarged detail showing the parts in the "off" position, after partial relative rotation of the reflector and casing.

Fig. 3 is a similar view showing the parts in the "on" position, after axial movement of the reflector in relation to the casing.

Fig. 4 is a similar detail view showing the parts in the locked "off" position.

Fig. 5 is an end view of the lamp casing, as seen from the left of Fig. 1, the collar, front glass and reflector being removed.

Fig. 6 is a rear view of a carrier ring for three insulating pads, and Fig. 7 shows one of these pads removed.

Fig. 8 is a sectional elevation of the reflector.

Figs. 9 and 10 are sectional elevations of contact members normally attached to the reflector.

Fig. 11 is an end view of the reflector, as seen from the right of Fig. 8, with these contact members attached.

Fig. 12 is an elevation, in part section, of a safety ring fitted to the lamp.

Referring to Fig. 1, the lamp body, which may consist of an aluminium-alloy casting, comprises a cylindrical portion 10 forming a casing for the battery or batteries 11, closed at one end 12 and open at the other end, the latter being flared outwardly as at 13 to provide a cylindrical extension 14 of larger diameter. Within the flaring portion 13 of the body, there are provided three evenly spaced lugs 15, beyond which the extension 14 is bored out to form a shoulder 16. A metal ring 17 of angle-section is fitted tightly into the extension 14 and against the shoulder 16, being secured by any conventional means; the inner flange of this ring is divided, as seen in Fig. 5, by three gaps 18 spaced evenly apart and located between the lugs 15, the back of this flange thus forming three arcuate ledges 19, each of which has a radial wall 20 at one end. Between these ledges and the lugs 15, there are fitted three insulating pads secured in place by adhesive or by pinning; each of these pads comprises an arcuate cheek 21 partly recessed into the face of the ledge and a shorter cheek 22 fitting against the lug 15, the two cheeks being made separate or connected together at one end of the ledge. The cheek 21 extends for about three-quarters of the angular length of the respective ledge 19, and its exposed face is divided by substantially radial humps into two sectors, the remaining portion of the ledge adjacent to the wall 20 being stepped up approximately flush with the end of this cheek.

The pad-carrier ring 17, which is fixed in relation to the lamp body, co-operates with a rotatable reflector or lamp head 23 for switching the lamp on and off by relative rotary movement; the reflector, shown separately in Figs. 8 and 11, comprises a central socket 24 for holding the lamp-bulb 25, which may be of screw type or push-in type, and it is provided with a flanged rim 26, having an inner flat face parallel with the outermost edge of the extension 14 at the open end of the lamp body. The reflector 23, including its socket 24 and its flanged rim 26, may be made in one piece of aluminium alloy, being preferably fitted with a polished metal liner 27; it is covered by a separate front glass 28. The reflector rim 26 and the front glass 28 are engaged in internal annular grooves 29, 30 respectively within a cap or collar 31 made of rubber or like resilient material, which is rotatable together with said rim and front glass in relation to the lamp body. The collar is formed with an approximately cylindrical flange 32, which fits around the extension 14, the flange 32 being relatively thin and terminating in a bead 33; this bead is preferably circular in cross-section and slightly smaller in diameter than the extension 14, upon which it therefore grips tightly to ensure water-tightness of the collar 31, without however preventing relative movement as required for switching the lamp on and off.

The reflector or lamp head 23 is provided with a contact member preferably made in the form of a spider 34 attached to the base 35 of the reflector, as by screws, and having three evenly spaced contact arms 36; these arms project beyond the circumference of the base to positions where they may co-operate with the carrier ring 17 for closing the lamp circuit or with the insulating pads on this ring for interrupting the circuit, the extremities of the arms being preferably bevelled on their edges.

As seen in Fig. 1, the contact arm 36 engages directly with the carrier ring, so as to close the circuit, all three contact arms being similarly engaged with the ring under the axial pressure of the spring 37 maintaining the batteries in engagement with the lamp 25; this pressure will be evenly distributed upon the three arms. Upon rotation of the reflector 23 by means of the rubber collar 31, for interrupting the lamp circuit, the arm 36 is moved from engagement with the ring 17 and brought onto the end of the cheek 21 of the insulating pad, as seen in Fig. 2, all three contact arms being similarly moved onto the insulating pads. In this position, however, the lamp may be brought back into operation, as for temporary or intermittent illumination, by pressing the reflector 23 axially towards the lamp body, thereby bringing the rim 26 of the reflector into contact with the open end of the extension 14 as seen in Fig. 3; it will be sufficient to tilt the reflector, as by pressure at one point of the collar 31, in order to establish the circuit, which will be interrupted as soon as such pressure is removed. By further rotary movement of the collar and reflector 23, each of the contact arms 36 may be brought into the position shown in Fig. 4, where the arm is engaged between the two cheeks 21, 22 of the insulating pad, all three arms 36 being similarly engaged in their insulating pads; in this position, therefore, the lamp is positively locked out of operation, and no axial or tilting pressure will serve to close the circuit, the locked position being therefore advantageous in cases where the lamp has to be stowed with possibility of axial or tilting movement or end pressure.

The base portion 35 of the reflector or lamp body is shown provided with an insulating sheath 38 to obviate risk of accidental closure of the circuit by contact between this base and the interior of the carrier ring 17 which is in conductive connection with the casing or body.

With the reverse direction of rotation, the arms 36 will be brought from the locked position (Fig. 4) between the cheeks of their insulating pads, first into the open-circuit posi-

tion (Fig. 2) where they press against the longer cheeks 21 of the pads, and secondly by further rotation into the closed-circuit position (Fig. 1) where they press against the carrier ring 17 and thus cause the illumination of the lamp. By still further rotation, the contact arms may be lifted over the walls 20 and brought into alignment with the gaps 18 between the ledges 19 of the carrier ring; in this position they will allow the reflector or lamp head 23 to be withdrawn from the lamp body, together with the rubber ring 31, for example if required to replace the battery or batteries 11 or the lamp bulb 25.

Due to the tight engagement of the collar flange 32 with the exterior of the extension 14, axial movement of the reflector 23 in relation to the lamp body for intermittent illumination may be resisted by slight compression of the enclosed air, but this can be relieved by displacement of air from the interior into the thin flange 32, which expands to form a bulge 39, as indicated in Fig. 3, without affecting the tightness of the closure effected by the cylindrical bead 33, which can roll in place. It will be understood that on the axial return of the reflector to its normal position, the displaced volume of air can leave the bulge 39 in the flange and re-enter the lamp body.

During the fitting of the collar 31 and lamp head 23, the air enclosed in the lamp body will similarly be subject to a slight compression, which can be accommodated by the bulge in the flange until the pressure falls again, when the contact arms 36 are in their normal position; upon removal of the rubber collar, appreciable suction may occur within the lamp body, resulting in a rather sudden release of the collar and the possible jerking of the batteries 11 out of the casing; this may be avoided by the provision of small vent holes as shown at 40, sufficient to reduce the vacuum gradually as the collar is pulled off.

In addition to the contact members 34, 36, the reflector also carries a contact member consisting of a soft metal stud or rivet 41 normally interposed between the centre pole of the lamp bulb 25 and the centre pole of the adjacent battery 11, in order to avoid wear at the lamp contact, due to tilting or rotary movement of the reflector, and possible unscrewing of the lamp bulb, due to the rotary switching movement. This contact member or stud 41 is carried by a plate 42 made of insulating material such as fibre, secured upon the base 35 of the reflector, so that the stud turns to and fro together with the reflector and lamp bulb.

The improved battery lamp is substantially water-proof and also proof against gas, flame and dust, so that it is particularly suitable for use in mines and other places where there is danger of explosion caused by sparks at electrical contacts; in order to prevent unauthorised removal of the resilient rubber cap 31 and consequent opening up of the lamp under such circumstances, means may be provided for locking the cap in position, while allowing its rotary movement. For example, as shown in Fig. 12, there may be fitted over the head of the lamp a safety ring 43, made in two halves locked together in position by screws 44, of a suitable type which requires a special key or spanner for their release; provision may also be made for a sealing wire to prevent the removal of the safety ring.

The lamp body or casing 10, the inserted carrier ring 17, the reflector or lamp-head 23 and the contact member 34 may be manufactured as mouldings, castings, stampings or spinnings of sheet metal; it will be understood that the invention is not limited to the particular embodiment described and illustrated, but may be modified to suit various conditions of use, within the scope of the appended claims.

WHAT WE CLAIM IS:—

1. An improved electric battery lamp in which a bulb-holding reflector or lamp head, partially rotatable in relation to the battery casing by means of a cap or collar to effect switching of the lamp circuit, is also movable axially or by tilting in relation to the casing in order to provide for intermittent illumination of the lamp, by bringing the rim of the reflector into contact with the open end of the casing.

2. A battery lamp according to claim 1, in which there is provided an additional position in the rotary movement of the reflector, at which position it will be locked against axial movement.

3. A battery lamp according to claim 1, in which a resilient cap or collar fitted around the open end of the lamp casing, is formed with an integral flange, this flange being expansible to accommodate air displaced from the interior of the lamp casing by the axial movement of the reflector to provide for intermittent illumination.

4. A battery lamp according to claim 3, in which the flange comprises a thin portion of substantially cylindrical shape, normally fitting around the open end of the casing but expansible by bulging outwards to accommodate displaced air, and a terminal bead slightly smaller in diameter than the open end of the casing.

5. A battery lamp according to claim 1, in which the battery casing has a flared open end providing a cylindrical extension of larger diameter, into which there is fitted a metal ring having an inner flange divided so as to form three arcuate ledges, insulating pads associated with these ledges being engageable by three contact arms projecting from the rotatable reflector, and these contact arms being adapted to engage with the respective ledges in the closed switching position.

6. A battery lamp according to claims 2

and 5, in which each of the insulating pads comprises two cheeks of different lengths, secured in relative position towards one end of the respective ledge, the contact arm being engaged between the two cheeks in the locked position of the reflector.

7. A battery lamp according to claim 5, in which each of the arcuate ledges has a radial wall at one end, the contact arm being lifted over this wall in passing from the normal working positions into alignment with a gap between adjacent ledges for removing the reflector from the casing.

8. A battery lamp according to claim 3 or 4, in which the open end of the lamp casing is formed with one or more vent holes, normally covered by the flange of the resilient cap or collar, to reduce the internal vacuum as the collar is pulled off.

9. A battery lamp according to any of the preceding claims, in which an insulated contact member supported by the reflector is interposed between the centre pole of the lamp bulb and the adjacent battery.

10. An electric battery lamp, substantially as described with reference to and as illustrated in the accompanying drawings.

For the Applicants,
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PROVISIONAL SPECIFICATION

No. 13528 A.D. 1956

Improvements in and relating to Electric Lamps

We, B. M. LAMPS LIMITED, of 7, Brunswick Place, Southampton, a British Joint Stock Company, do hereby declare this invention to be described in the following statement:—

This invention relates to electric lamps, more particularly electric battery lamps of the self-contained type, and it consists of an improvement in or modification of the electric lamp described in our Patent Specification 742,804.

According to the present invention, the lamp reflector, which is partially rotatable in relation to the casing to effect switching of the lamp circuit, is also movable axially in relation to the casing in order to provide for intermittent illumination of the lamp.

The reflector is provided with contact fingers, preferably three in number and spaced at angles of 120 degrees apart, and the casing is provided with an internal flange divided to to form the same number of arcuate ledges, upon which insulating pads are engaged, the gaps between the ledges and pads allowing for the passage of the contact fingers when the reflector is being mounted upon or removed from the casing. The pads are formed with cam faces over which the contact fingers ride, the contour of the cam faces being such that in one position of the fingers they are raised from contact with the ledges, but in another position they are allowed to make contact with the casing, for example on the ledges. In the first-mentioned position also, however, the fingers can be brought into contact with the casing by axial movement of the reflector relatively to the casing, such axial movement being opposed by the usual coiled spring or other device for maintaining the battery in engagement with the centre pole of the lamp bulb; in order to facilitate the axial movement, the rubber ring or collar holding the reflector and casing together may be modified, the ring or collar having for example only one internal annular groove in which the rims of the reflector and front glass are engaged and a cylindrical flange which fits around the flared or enlarged open end of the casing.

In a convenient embodiment of the invention, the lamp casing consists of an aluminium-alloy tube of cylindrical shape, closed at one end and open at the other end, which is arranged to form a cylindrical extension or larger diameter. A concave or dished reflector, having a central screw-socket for holding the lamp bulb, is provided with a flanged rim, the inner flat face of which lies approximately parallel with the outermost edge of the casing; three radially disposed contact fingers extend outwardly from the rear end of the reflector, each of these fingers having a cranked tip pointing towards the rim of the reflector. The reflector, including its bulb-socket, flanged rim and contact fingers, is made in one piece from aluminimum alloy, and it is equipped with a separate front cover made of glass or other transparent substance; this front cover and the rim are engaged in an internal annular groove within a thick ring or collar made of rubber or like resilient material, having a front internal flange which extends partly over the front cover, and a rear flange of cylindrical shape which fits around the cylindrical extension at the open end of the casing. A small friction plate may be interposed between the centre pole of the lamp bulb and the central contact of the battery in order to avoid wear at the end of the bulb.

The cylindrical extension of the casing is formed with an internal flange, which is divided into three arcuate ledges by gaps spaced at 120 degrees apart, these gaps allowing the passage of the three contact fingers when the reflector is being mounted upon or removed from the casing; upon each of these ledges there is fitted tightly an insulating

pad, made for example of hard fibre or like material. Each pad comprises a front flange of arcuate shape to cover the outer face of the respective ledge, an external groove behind the flange fitting tightly upon the arcuate ledge, and a rear portion of smaller radial extent than the flange; this rear portion is stepped circumferentially to provide two cam faces, an intermediate bevelled hump and two terminal blocks. When the parts are assembled, each contact finger, after passing through the respective gap in the divided flange of the casing, rides over one terminal block as the reflector is turned in relation to the casing, then over the two cam faces and the intermediate hump, and finally abuts against the other terminal block, which is of sufficient height to prevent further rotation; the contact finger therefore remains over the second cam face, which holds up the tip of the finger clear of the ledge, so that the lamp circuit is interrupted. The adjacent edge of the hump is substantially square, so that the finger cannot slip over it as the result of vibration, but if it is desired to light the lamp, the reflector and casing are pressed together sufficiently for lifting the fingers over the humps and are turned backwards in relation to one another so as to bring each contact finger over the first cam face, which is of less height than the second one, so that the tip of the finger engages with the ledge, thereby completing the lamp circuit. In order to extinguish the lamp, the reflector and casing are turned in relation to one another so as to bring each contact finger over the second cam face, the finger rising over the hump by reason of the bevelled edge of the latter. In order to remove the reflector and front glass for changing the battery, the reflector will be pushed hard back to clear the cams and then turned slightly to bring its contact fingers into line with the gaps and clear of the cams.

Intermittent lighting of the lamp can be obtained, if desired, while each contact finger is over the second cam face, by forcing the reflector axially towards the casing, the flat back of the contact fingers then making contact with the wall of the casing behind the cylindrical extension, so long as the pressure is maintained against the opposing force of the battery spring.

The casing may be provided at its closed end with an attachment for carrying a spare lamp bulb; this attachment may consist of a rubber moulding, having an internal cavity adapted to house the spare bulb, and an external lip which engages frictionally upon the outside of the casing. This attachment or bulb-container will be particularly applicable in cases where the lamp is employed as a cycle rear-lamp, for which purpose the casing may be fitted with a bracket or clip set at a suitable angle for clamping upon one of the rear forks of the cycle frame.

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PROVISIONAL SPECIFICATION

No. 37161 A.D. 1956

Improvements in and relating to Electric Battery Lamps

We, B. M. LAMPS LIMITED, of 7, Brunswick Place, Southampton, a British Joint Stock Company, do hereby declare this invention to be described in ths following statement: —

This invention relates to electric battery lamps of the self-contained type, comprising a battery casing having a closed end and an outwardly flared open end, the latter being provided with a rim-fitted reflector including a bulb-holder, and the parts being held together by a removable ring or collar made of rubber or like resilient insulating material, encircling the casing and reflector rim but permitting their relative rotation to effect switching of the lamp circuit.

In our pending Application No. 13528/1956, we have described an improved electric battery lamp of this character in which the reflector is not only rotatable in relation to the casing in order to effect switching of the lamp circuit, but is also movable axially in relation to the casing so as to bring its rim into contact with the open end of the casing in order to provide for intermittent illumination of the lamp.

In the embodiment described in the said Application, the resilient insulating collar extends partly over the transparent front cover, which fits close against the outer flat rim of the reflector, and this collar also fits around a cylindrical extension of larger diameter at the open end of the casing.

It has been found in practice that although the collar may fit around the cylindrical extension sufficiently tightly to exclude water under normal conditions, the fitting of the resilient collar or the axial movement of the reflector in relation to the casing for intermittent illumination of the lamp may set up a slight compression of the air enclosed in the lamp; this pressure may be sufficient to lift the collar from the cylindrical extension, with consequent escape of air, in which case the return of the reflector to normal position will produce a partial vacuum inside the casing, this being

liable to suck in water if the lamp is submerged, or to draw in damp air at other times.

The present invention has for its main object to prevent such escape of air and consequent partial vacuum, even to the extent of retaining a slight pressure of air inside the lamp, so as to eliminate the risk of water or damp being introduced into the lamp.

According to the invention, the ring or collar is provided not only with its partial extension over the front cover of the lamp, but also with a bead or rim at its opposite end, this bead or rim being preferably circular in cross-section and being smaller in diameter than the cylindrical extension of the casing so as to grip tightly thereon, and the intermediate portion of the collar is expansible so as to accommodate the volume of air displaced from the interior of the casing by the axial movement of the reflector in relation thereto, whether in the fitting of the resilient collar or in the intermittent switching on. Thus the air escaping from the interior will force its way into the space afforded by the intermediate portion of the collar rising from the cylindrical extension as it expands, and on the return movement this air will pass back into the interior of the lamp, there being substantially no change of internal pressure and no subsequent partial vacuum until the resilient collar is drawn off for inspection or replacement of the bulb or battery.

The intermediate portion of the collar may rest normally against the cylindrical extension, its rise from the latter causing the circular-section bead or roll on the extension while still giving a positive seal at this point; under exterior pressure, the intermediate portion will be pressed tightly inwards against the cylindrical extension, thus improving the seal against external pressure, for example when the lamp is submerged.

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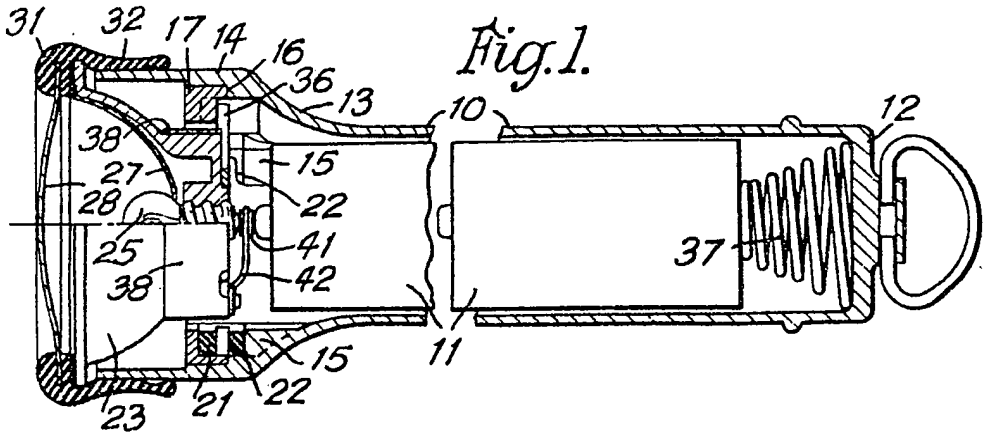

Fig. 1.

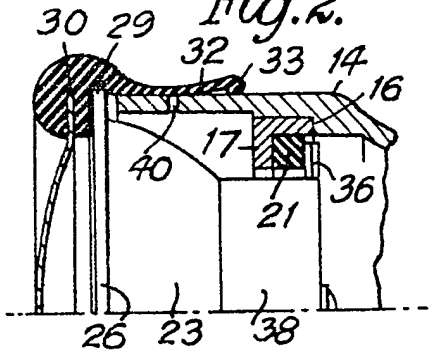

Fig. 2.

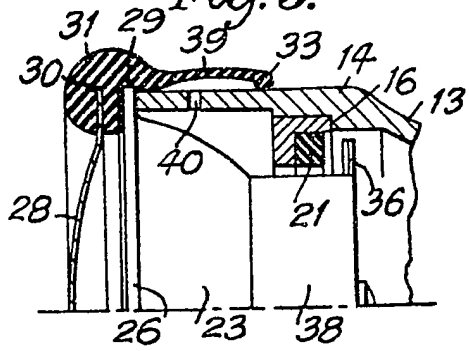

Fig. 3.

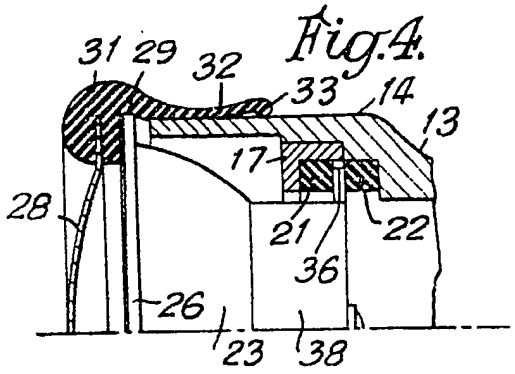

Fig. 4.

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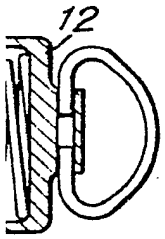
SHEETS 1 & 2

Fig.6.



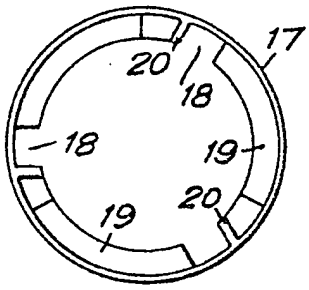
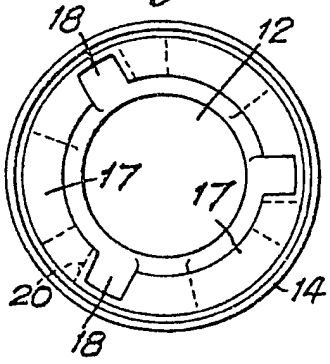


Fig.7.

Fig.5.



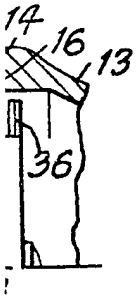


Fig.8.

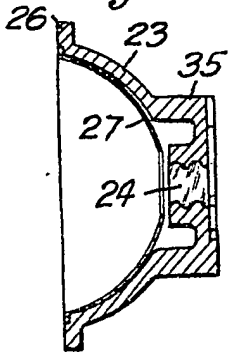


Fig.9.

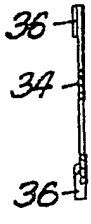


Fig.10.

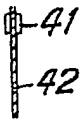
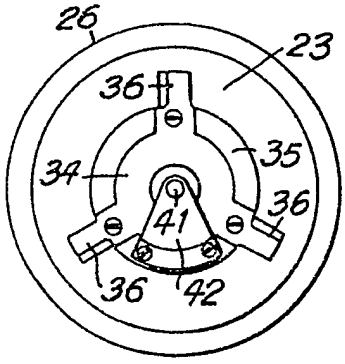


Fig.11.



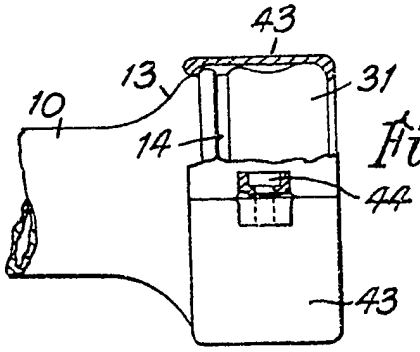


Fig.12.

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Fig.1.

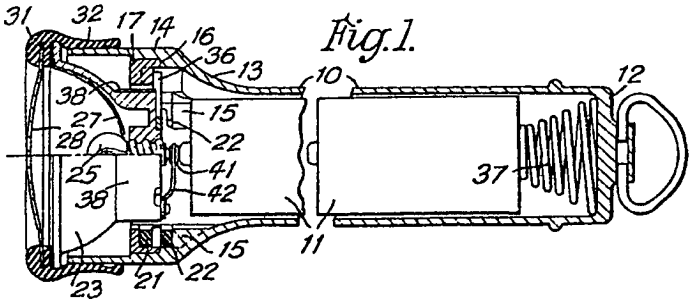

Fig.2.

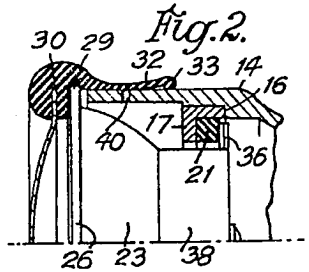

Fig.3.

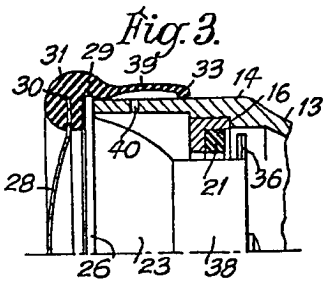

Fig.4.

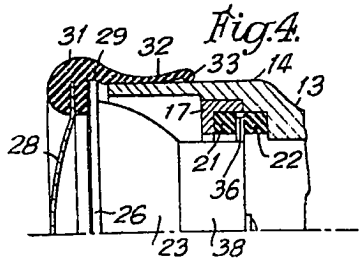

Fig.6.

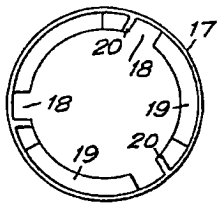

Fig.7.

Fig.5.

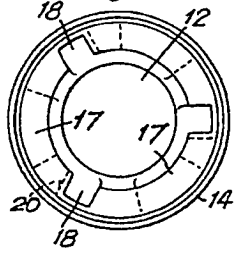

Fig.8.

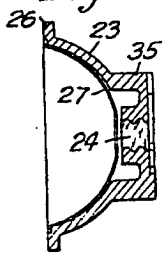

Fig.9.

Fig.10.

Fig.11.

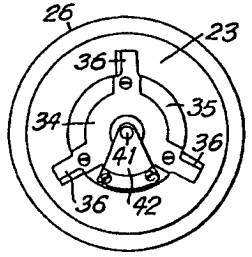

Fig.12.